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There are estimated up to 300,000 landmines buried in Jordan soil. There are estimated up to several thousand mine victims, and there continue to be civilian and military causalities each year. Recent reports say that increasingly, Jordanian deminers from the Royal Corps of Engineers are at risk as they do painstaking work of clearing mines throughout the country. The injured will need life-long rehabilitative and prosthetic care.

Jordan started demining on February 15th 1993 on three main tracks, southern Jordan valley, northern Jordan valley and southern region frontier but due to the logistic complications, the whole operation was centralized to the Royal Corps of Engineers, where it was easy to control the efforts exerted and provide all the basic requirements "general safety equipments, mine sweepers, loaders and bulldozers".

The demining process will be carried out over 5 phases, Jordan so far removed good percent of phase 1 and 2, and the entire number of mines dug up has come up to 96,650 mines.

Complying with the transparency measures, Jordan has set a plan through which all the stockpiled anti-personnel mines will be completely demolished over a period of three years, where a comprehensive mine awareness program will be launched via different means of mass media to caution the people to the dangers of mines.

"Jordan Mine Action"

MONOGRAPH

BY

BRIGADIER GENERAL AL-DWAIRI, FAYEZ

Jordanian Army

SCHOOL OF ADVANCED MILITARY STUDIES
UNITED STATES ARMY COMMAND AND GENERAL STAFF COLLEGE
FORT LEAVENWORTH, KANSAS

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MONOGRAPH APPROVAL

Brigadier General Fayez Al-Dwairi

Title of Monograph: Jordan Mine Action

Approved by:

James J. Schneider, Ph.D. — Monograph Director

Robert H. Berlin, Ph.D. — Professor and Director Academic Affairs, School of Advanced Military Studies

Philip J. Brookes, Ph.D. — Director, Graduate Degree Program

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CHAPTER 1

INTRODUCTION

In 1994, a US report stated that the number of anti-personnel mines planted all over the world is approximately 80-110 millions. Every year 80,000 mines are being removed compared to 2.5 millions being planted[1] . However the following reports were more promising especially when they estimated that the mines being removed annually outnumber those being planted, and the total number of land mines in place around the world is approximately 30-50 percent lower than the originally estimated. Such reports made some experts believe that this problem can be solved in a few years instead of tens of years.

Anti-personnel mines are heavily concentrated in numerous countries most of which lie in Asia, Africa, and Latin America where civil wars and regional conflicts are prevalent. It is true that the number of these mines in only 12 countries comprises 50% of all mines all over the globe; however, the size of this problem is not measured by the number of mines per acre but by the vast area that has become dangerous and unsafe to use without spending huge amounts of money for medicine, economy, environment, security and rehabilitation centers.

Every week, anti-personnel mines inflict death and deformation on hundreds of innocent people. Therefore, to put an end to this prolonged agony and after many tireless endeavors, many countries have recently reached a biding international agreement that prohibit using, storing, producing and transferring AP mines and requires there

destruction in addition to assisting rehabilitating and reintegrating the victims socially and economically. Fortunately, these efforts have finally been made possible when the Ottawa Convention was approved.

Jordan has always been a strong advocate of the agreement especially since His Majesty the Late King Hussein asked that Jordan sign and approves Ottawa Convention. Indeed, it was signed on 11 Aug. 98, ratified on 13 Oct. 98 and acted on 1 May 99.[2] Likewise, His Majesty King Abdullah has always backed up the Jordanian efforts aiming at persuading other countries to join this agreement and to abide by its articles so that we can all live in a mine-free planet. Her Majesty Queen Noor is patron of the landmine Survivor Network and has become a leading spokesperson to promote a global ban on landmines and increased supports for mine victims.

Jordan has 303016 mines of which Jordanian Armed Forces planted 232100 mines over the past decades while Israeli Defense Force has been responsibel for 70916 mines planted in Wadi Araba and Al-baqourah areas.[3] The entire mined area covers 17,500 Acres mainly located in the Jordan Wally, the western slopes of the Eastern Heights and the Syrian-Jordanian borders, a thing that prohibits Jordan from using its best arable lands. These mines have caused severe injuries to several thousand of persons most of whom are defenseless civilians.

As of 1993, Jordan has launched an ambitious comprehensive demining program aiming at:

- Protecting people from the hazard of mines
- Reusing the lands for agriculture

- Establishing new industrial projects, new Hi-ways and widening the current ones
- Bolstering confidence that was made possible after the peace process

Jordan has so far removed good percent of mine fields, and the entire number of mine dug up have come up to 96,650 mines of which 44,500 are anti-personnel, whereas the rest are anti-tank. Jordan is committed to removing all kinds of mines, and that is more than what Ottawa Convention requires.

Jordan has 19 demining teams that comprise 380 officers and other ranks provided with the best mine preventive equipment and enjoy excellent experience.

CHAPTER 2

Long - Term Effects Of Landmines and UXO

The effects of landmines extend beyond the coast of landmine removal and immediate medical treatment of the victims. The cost required to remove one landmine is, on average, from $300 to $1000, and the cost for surgical care and fitting of an artificial limb is $3000, or more per amputee in some countries [4].But the further problem is the long-term effect on people and their environment. Landmines stand in the way of efforts to restore war-torn societies to normal life. Landmines have an impact on virtually every aspect of life in the mine-affected countries and on the international community as it seeks effective ways to help those countries recover. The unseen costs and impact of landmines include:

Refugees and Returnees

In war-torn countries landmines are a serious obstacle to the resettlement of Internal Displaced Person (IDP) and Refugees since routes of return to their former areas and settlements are often mined. A recent report from UN High Commissioner for Refugees(UNHCR) forecasts that "although the number of people forced to abandon their homes across the world will continue to rise, fewer will be able to find safe refuge." [5] According to this report, as of january 1, 1997, some 22.7 million people were at risk: 13.2 million refugees, 4.9 million IDPs, 3.3 million returnees, and 1.3 million others. Of these 22 million people, more than half were located in the most heavily mineded countries (Afghanistan, Angola, Bosnia, Cambodia, Croatia, Eritrea, Iraq, Nicaragua, Mozambique, Somalia, and Sudan).

A study of refugees who returned to Afghanistan from Peshawar, Pakistan revealed that between 20 and 40 percent of them became casualties because they were unfamiliar with the location of minefields.

Medical

The most visible impact is on victims, the men, women, and the children who lost limbs and/or sight after stepping on landmines. But landmines also lead to indirect public health problems, such as the spread of polio, in areas where roads, farms and access to public health clinics are mined, and mass immunization against polio, is difficult to carry out.

There are also clear links between landmines and malnutrition. Most affected countries lose many "breadwinners" between the ages of 15 and 50, preventing families from earning the money needed to buy adequate nutritious food.

Treatment and rehabilitation of victims, when service are available, can take years and deplete scare medical resources in affected (poor) countries.

Environmental

The presence of landmines has a major impact on a countrys environment. The unavailability of some farmland due to the presence or suspected presence of landmines in an area leads to overuse of existing lands. Some of the agrarian population is forced to move to cities and towns, contributing to overcrowding, unemployment and additional pressure on governmental services such as sewage, garbage disposal, and other urban resources. The danger posed by landmines to live stock and athoer animals is also significant, since they can have long term impact on their habitat.

Economic

The presence of landmines has major effects on the economic life of countries trying to recover from conflict. The country suffering from landmines is economically crippled because the rest of the country economy is so dependent on the productivity of the agricultural sector. Furthermore, social structures are overburdened or exhausted, scarce national resources must be directed toward demining-related activities, and dependence on international assistance continues. Beside that, landmines prevent fullest utilization of farmland, destroy livestock, inhibits tourism and other potential investment and development opportunities.

Social and Political Reconciliation

Reconciliation requires governments to extend their presence and their services to formally worn-torn areas. Landmines threaten the peace process, as will as impede post-conflict recovery and reconstruction by preventing the government services, and acting as physical obstacles to unity and reconstruction. As noted above, mobility is a prerequisite for spreading governmental influence. When roads and railway networks are mined, costly air transport may be the only means of reaching some communities. Often even such transport is unavailable when warring factions bar relief agencies or government representatives from using airfields.

CHAPTER 3

Mine-Affected Countries

About 70 countries currently reported having a landmine or unexploded ordnance (UXO) problem, according to the UN Landmine Database(UNLDB). That number has grown from the 65 that reported such problems years ago. This increase reflects, in part, the emergence of newly independent states and the changing borders brought about the collapse of the former Soviet Union and the former Yugoslavia, as well as the conflicts that have taken place in these araes.

The countries profiled in this chapter are the ten with the highest number of landmine casualties (Afghanistan, Angola, Bosnia-Herzegovina, Cambodia, Croatia, Eritrea, Iraq, Nicaragua, Mozambique, Somalia, and Sudan). These countries together account for almost 50 percent of the landmines currently deployed in the world.

ANGOLA

More than three decades of almost constant internal conflict have left Angola with one of the world's most seious landmine problem.The UN estimates that 10 to 15 million landmines in Angola is roughly cited, but no comprehensive national survey has yet be completed.[6] Some NGOs, based on current clearance experience in Angola, consider the official estimates to be highly exaggerated and believe they should be lowered to less than a million. Approximately 60 different types of anti-personnel and anti-tank landmines have been found during clearance operations in Angola.

There are six to eight heavily mined provinces in Angola covering roughly 50 percent of the country in aband from the northwest border with the Congo to the southeast border with Namibia.

In 1995, the UN estimated that 1.5 percent of the population (10.5million) had been injured in landmines or UXO incidents. The International Committee of Red Cross (ICRC) and the UN children Fund have estimated that there are at least 120 new landmine victims per month. [7]

AFGHANISTAN

Afghanistan has been besieged by occupation, foreign interference, and civil wars since early 1978. The Soviets and their puppet regimes laid countless landmines in Kabul from 1979 to 1992, and some of the feuding Mujahidin factions have laid landmines since 1992.

The current UN figure for the number of landmines in Afghanistan, is 10 million, but the original source of this estimate cannot be verified and the actual number may never be determind. Recently, a UN study reported that the UN Office for the Coordination of Humanitarian Assistance to Afghanistan (UNOCHA) has reduced its estimate to 5-7 million. Some NGOs based on actual clearance experience, in heavily mined areas, claim that official estimates are still too high and should be lowered to less than a million. [8]

The most heavily mined areas are the provinces bordering Iran and Pakistan(the western, southern, and eastern parts of the country). Security belts of landmines exist around major cities and at airports, government installations, and power stations. Grazing lands, waterwayes, schools, paths, villages, and cities are infested with mostly antipersonnel mines.

National figures on the rate of landmine-related injuries and death are not available, but casualty estimates indicate that landmines and UXO cause 10-12 civilian

casualty per day. [9] Recent ICRC suggests that this figure is too low, since many victims never get to treatment center because of lack of transportation.

BOSNIA-HERZEGOVINA

The daily threat of landmines is a constant reminder of the five-year-long civil war that broke apart Yugoslavia. The inter-ethnic strife that began in 1992 resulted in heavy mining of vast areas of the country including economic and social centers; civilians became the target of landmines in "ethnic cleansing" campaigns. Today, Bosnia-Herzegovina has the most sever landmine problem in Europe.

Some 600,000 – 1 million landmines and a yet largely undetermined amount of UXO are estimated to infest some 300 square kilometers of land. The majority of minefields are unmarked, and those that were marked were often identified by carvings on trees, branches, or red tape, which are not easily distinguished means and do not last over time. [10]

The areas of heaviest landmine concentrations are consistent with the regions where ethnic conflict occurred. Concentrations of minefields are found in the Zone of Separation, which was the front line during the civil wae. Many factories, homes, and schools that were mined remain abandoned. In the Federation, about 100 square kilometers of agricultural land are unusable because of landmines.

The ICRC reported that, in the six months following the Accords, there were 50 landmines-related casualties each month, but by early 1998, the rate had fallen to 30-35 per month where civilians represent 80 percent of them. [11]

CAMBODIA

Cambodia's many conflicts and the indiscriminate use of landmines during those periods have inflicted suffering mainly on the rural poor who inhabit the land in and around mineinfested areas. Primarily, but not exclusively, the result of landmines, Cambodia has one of the two highest proportions of amputees in the world, one out of every 245 individuals.[12]

As a result of more than two decades of war, it is estimated that cambodia has 4 to 6 million landmines in the ground. Further details in terms of the number of landmines and UXO are not available, but of the 17,000 landmines destroyed by the Cambodia Mine Action Center in 1997, 99 percent were antipersonnel mines consisting of eight types, and just over 1 percent were antitank mines of two different types. UXO destroyed from 1993 through 1997 has included mortar rounds, rockets, artillery rounds, small caliber munitions, bomblets, fuses, rifle grenades, and bombs.[13]

Landmines/UXO maim or kill 100 people per month in Cambodia. This marked a significant drop from 1996, when an average of 230 mine incidents per month were reported. Records, although incomplete, indicate that during 1979-1997, 38,786 people were injured by landmines/UXO and, of those, 13,586 died.[14]

CROATIA

Croatia's war of independence from Yugoslavia along with heavy mining of the country began in 1991. Landmines were laid primarily as defensive measures to prevent the Yugoslav Army from advancing; nearly one-quarter of the terrain has either a landmine or UXO problem.

There are more than 400,000 landmines and 3,000 tons of UXO in Croatia, scattered over approximately 11,910 square kilometers. Previous landmine estimates were as high as several millions, but these estimates were based upon pre-war stockpiles and are not supported by serveys. [15]

The areas of heaviest contamination is consistent with the confrontation lines during the war. Landmines have been found in areas of economic importance, such as long railroad lines and pipelines and near utility stations.

Between 1992 and 1998, there were 125 deaths and 552 injuries attributed to landmines. The casualty rate may continue to increase, as refugees and IDPs return home to regions that were heavily mined during the war.

ERITREA

Based on estimates provided by the American Embassy in Asmara there are 500,000 to 1 million anti-personnel mines and 3 million UXO in Eritrea, but ther are no historical data available to determine the approximate number of landmines per square kilometer. [16]

Specific locations of major minefields are not available since no survey has been conducted, in general, many of the landmines and minefields are located near populated areas, this creates problems and routinely causes causalities among people and livestock.

Current and complete landmine casualty statistics are not available. Between May 91 and May93, there were approximately 2,000 landmine incidents, which included civilians casualties as well as Eritrean military personnel invlved in deminig operations.[17]

IRAQ (KURDISTAN)

Northern Iraq (Kurdistan) is severely mine-affected. The region was heavily mined during the 1980-1988 Iran-Iraq war as the conflict waged throughout the region. Prior to the Gulf War, Iraqi military resources were concentrated in the south, and the northern borders were mined to protect the country from invasion. During the post-war Kurdish uprising, additional landmines were laid in the northern region.

The UN estimates that there are more than 10 million landmines and a large quantity of UXO in Iraq Kurdistan. Of these landmines, 8 million are estimated to be antipersonnel and 2 million antitank. It is possible to find almost every variety of landmine manufactured around the world in Iraq. Landmine and UXO are concentrated in the north Kurdish region, southern Iraq, and the area along Iran and Kuwait borders, and are commonly found near water resources and the rural farmland, mining was not restricted to borders; mines are known to be located throughout the northern region in such areas as Penjwin, and the region near Basra. [18]

According to hospital statistics, between January 1991 and December 1996, there were 6,715 reported landmine-related casualties, including 2,391 deaths and 4,324 injuries.[19] These numbers probably represent only a fraction of the total, because the records are kept at hospitals, and many victims who are injured in rural regions do not have transportations to make the long journey to a medical facility.

MOZAMBIQUE

Mozambique suffered from 20 years of civil warfare until the 1992 peace accord was signed. The most widely cited number of landmines in Mozambique has been the

1992 UN estimate of more than 2 million. Some NGOs argue that the UN estimates are too high and it should be 250,000 to 300,000. [20]

Minefields have been located in all provinces, but the most heavily mined region is along Zimbabwean border area on the west. More than 1.7 million refugees and 4 million IDPs have returned to their homelands since the signing of the peace accord in 1992. returnees have found that minefields were planted in defensive perimeters near military installations, bridges, along access roads, railways, and power lines; and in areas to prevent population access to water points, schools and clinics. Perhaps the most devastating use of landmines was their random placement in fields and along access paths to stop peasants from producing food.

No comprehensive number of landmines casualties for all provinces exists, and there are wide variances(20 to 50 per month) reported, but Mozambique still content with the statistics that nearly 10,000 people have become landmine victims since the signing of the peace accord in 1992.

NICARAGUA

Nicaragua was involved in armed conflict and civil strife for a period of almost 12 years, ending with presidential and parliamentary elections in 1990. During the conflict, all warring factions used landmines. Government forces mined installations in the interior of the country to prohibit access, possible sabotage, or destruction by the rebel forces(Contras); they mined portions of the borders to prevent cross-border infiltration by the rebels. The Contras mined roads, transport routes, and economically sensitive areas to disrupt the economic life of the country in an attempt to destabilize the government.

During the period of armed conflict, the two sides laid about 134,000 landmines.[21] The most heavily mined areas are the northern and southern borders, and the central departments. Landmines were laid around electrical towers, bridges, military bases and agriculture cooperations.

According to a Nicaraguan Center for Strategic studies, 424 people have been victims of landmines since the end of civil war in 1990. [22]

SOMALIA

Somalia is one of the most insecure and unstable nations in the world. The disintegration of the national government began with the bungled invasion of Ethiopia's Ogaden province in 1977 and the war with Ethiopia that followed. After the conclusion of the war, factioal fighting continued and led to the eventual collapse of the national government. The heaviest mining occurred between 1977-1992, during the conflict with Ethiopia. After the collaps of the government, the warring factions continued to lay landmines.

More than 1 million landmines were laid in Somalia to protect against enemies and terrorize civilians; they are found along the Ethiopian border and around military bases, schools, water sources, and even individual homes. Sixty percent of the landmines are estimated to be antipersonnel mines. Compounding the problem is that 50 percent of landmines are non-metallic, and no minefield records have been located.

Physicians for Human Rights estimated that in 1992 were 4,500 people disabled as a result of landmine accidents, 75 percent of mine casualties were children 5-15 year of age. [23]

SUDAN

Sudan has suffered from more than 40 years of conflict. The country is governed under Islamic law that is opposed by the largely Christian southern region,and, since 1991, the government and the Sudanees People's Liberation Army(SPLA) have intensified fighting there.

The Sudan government recently stated that 2-3 million landmines and UXO cover some 800,000 square kilometers or 32 percent of the country. [24]

North western border with Libya, eastern border with Eritrea, and a round towns in southern Sudan have been minded.

According to UN reprrts,no specific casualty attributable to landmines is available, the government estimates that mine accidents have resulted in more than 700,000 amputees. A recent UN assessment team reported that few landmine victims arrived at medical centers, and of those who did reache the medical centers few survived, because it takes 2-6 days to reach a hospital[25].

CHAPTER 4

Types Of Land Mines

Mines vary in size, cost and destruction capacity. Generally, it is the military, often under direct orders from the government, who determine what kinds of mines are to be used, where they will be placed and what kind of pattern will be used in laying them out. Theoretically, the utilization of mines is determined by a specific, strategic policy designed to maximize defensive and offensive military capabilities. However, in the actual practice of warfare such rules are usually ignored, resulting in the indiscrimination terrorization of civilian populations. The placement of landmines within or in close proximity to non-military occupied areas can lead to both physical and psychological trauma.

A description of various types of mines and their common uses listed below provides a clear image of the insidious and pervasive threat caused by landmines.

Anti personnel (AP) landmines: these devices are designed to explode when a person walks on, or in some cases near them. They are often laid to protect military installations from enemy approach. In some countries anti-personnel mines are used to prevent enemy soldiers from removing anti-tank mines from strategically placed anti-tank minefields. In addition to maiming enemy soldiers, AP mines may delay and inconvenience enemy forces, as soldiers are required to remove a severelly injured person from the field of battle. Typically the worst scenario occurs when armies utilize anti-personnel landmines indiscriminately to

demoralize the civilians population by mining access routs to drinking water and fire wood sources, grazing and agricultural lands, as well as traveling paths.

- Anti-Tank (AT) Mines: these are large devices that explode when vehicles drive over them. Commonly used to limit and deter the movement of enemy troops.
- Improvised Explosive Devices: Also referred to as Booby-traps, these are designed to explode when a person opens a door, radio, TV, ...etc., picks up or handle a particular object such as a toy.
- UXO (Unexploded Ordinance): Missiles, rockets, grenade and other explosives that fail to explode upon impact, are referred to as Unexploded Ordinance, or UXOs. Most of these devices may still "alive" or active years or even decades after being released.

CHAPTER 5

Jordanian Demining Initiative

The Jordanian Landmine problem

General

Most of 509 minefields employed in Jordan extend along the Syrian and Israeli borders, and was constructed during the Arab-Israeli conflict in 1967. As a result, 303,016 mines, covering 17,500 acres of fertile land, threaten the safety and livelihood of the local inhabitation, and stifle economic growth of the country.

The minefields fall into two categories: those laid by Israeli Defense Force (IDF), and those laid by Jordan Army Force (JAF).

JAF minefields	110	anti-personnel (AP)
	83	anti-tank (AT)
	173	mixed (AP+AT)
		(232,100) Landmines
IDF minefields	99	AP
	34	AT
	05	Fragmentation
		(70,916) Landmines

Minefields Location

The Jordanian Armed Forces laid minefields are located in the Jordan River Valley and are concentrated in the northern west region of the country. They are devided in two areas: one area is towards the northern end of the Valley, near Lake Tibarias, the other is further south, near the northern end of the Dead Sea. The Israeli laid minefields

are located in the southern west region of the country within Araba Valley. Additionally, there is a strip of mined area (100 mile) on the northern border with Syria.

Nature of the Threat

The mine threat is very well defined in Jordan. A very limited number of mine types were used, and all are reported to be blast mines with pressure operated fuses. The Jordanian Armed Forces adopted British minefield construction procedure, so mines were laid in "clusters" within zigzag rows. No tripwires or anti-handling devices were used.

Most of the minefields are well documented by the Royal Engineering Corps. These records provided detailed information on minefield location and pattern, mine types employed, and incidents reported. The records are readily available and are used to support the national demining efforts.

The Jordanian demining efforts are hampered by heavy vegetation, especially those minefields located near the Jordan River. In low-lying areas mines can be found buried up to 1.5 meters. The deeply buried mines are due to extensive erosion and silt.

Since the majority of the mines were laid in 1967, many of the mines encountered by deminers date back at least 30 years. The four most common types found in the Jordan River Valley are the US M14 (AP) and M19 (AT), the British MK5 (AT), and the Italian designed "SACI" (or Egyptian Mine B Mark1).

MINE Casualties

Since 1967 the Jordanian Armed Forces report that over 400 civilians have been killed and several thousand have been injured by mines. There is a concern that these numbers will increase as mines shift (due to erosion) into remote tourist areas in the North Jordan River Valley.

In the same time of period 56 military personnel have been killed, and 224 injured. Most of these casualties occurred prior to 1993. Since 1993 the Jordanian deminers experienced only 47 non-lethal injuries. The Jordanians attribute the relatively low casualty rate (one injury per 2000 mines) in recent years, to stringent safety procedure, effective training programs, and effective protective equipment.

The Jordanian Humanitarian Demining Program

In 1993 Jordan unilaterally implemented a national demining program to address the landmine problems in the Jordan Valley. Through the years it has proven to be an efficient and effective program. The clearance operations are being conducted in five phases. Phase 1 has been completed and phase 2 is in its sixth year. The five phases are listed below:

Phase 1. This phase began on March 15, 93 and concluded on March 3, 93. Operations cleared areas that included on area working westward from the main north-south road (roads 15, 25, and 35) towards the Jordan Valley. Most of these minefields were well documented which provided the JAF with critical information to assist in its clearance operations. Jordanian deminers cleared 30 minefields (over 14,000 mines) during phase 1, returning over 600 acres of land for productive use by local inhabitants.

Phase 2. This phase commenced on May 29, 1995 and it is still in progress. The objective of this phase is to complete clearance of the area between the main roads and the Jordan River basin. The Royal Corps of Engineers (RCE) has indicated that demining in these areas are proving to be more challenging and dangerous. In contrast to those minefields cleared in phase 1, minefield data for these areas is not

complete and the accuracy of existing data is questionable. The inaccuracy of the data is attributed to extensive erosion and shifting sands that have either moved mines or deeply buried them. Vegetation has overgrown most of these areas, which adds to the difficulties encountered by Jordanian deminers. In spite of these challenges, Jordanian demining efforts in phase 2 have been successful, to date 179 minefields (83,650 mines) have been cleared, returning more than 5,600 acres of land for productive use.

Phase 3. This phase will commence after completion of phase 2. During this phase the Royal Corps of Engineers demining efforts will focus on remote areas.

Phase 4.This phase will commence after completion of phase 3. During this phase the Royal Corps of Engineers demining efforts will focus on minefields along the Syrian border.

Phase 5. Clearance of the IDF laid minefields in Arab Valley region started in September 1995. These clearance operations began as a joint effort by the Israeli and Jordanian governments. Demining operations ceased four years ago, leaving 70,916 mines in the region. Negotiations between the two nations to formulate a strategy to clear these areas are on going.

Demining Organization

Jordanian demining operations are managed and executed by the Jordanian Armed Forcesas depicted in Figure 1. Two divisions provide support to demining operations in their respective areas of responsibility. Each of the two division provide resources to organic Royal Corps of Engineers Battalions to form the demining teams. A total of 16 teams are currently conducting humanitarian demining, mine detection and

disposal operations. Each mining team consists of a team leader, a safety officer, and 12 deminers. A dedicated doctor, a medical assistant, and 3 drivers are attached to directly support the teams operations. A total of 380 Royal Corps of Engineers soldiers (including attachment) are directly involved in the Jordanian Humanitarian Demining program. In addition to mine detection and disposal operations, the engineer battalions are responsible for limited mine awareness (local level), detailed information management (manual), and UXO disposal functions.

Current JAF HD Organization

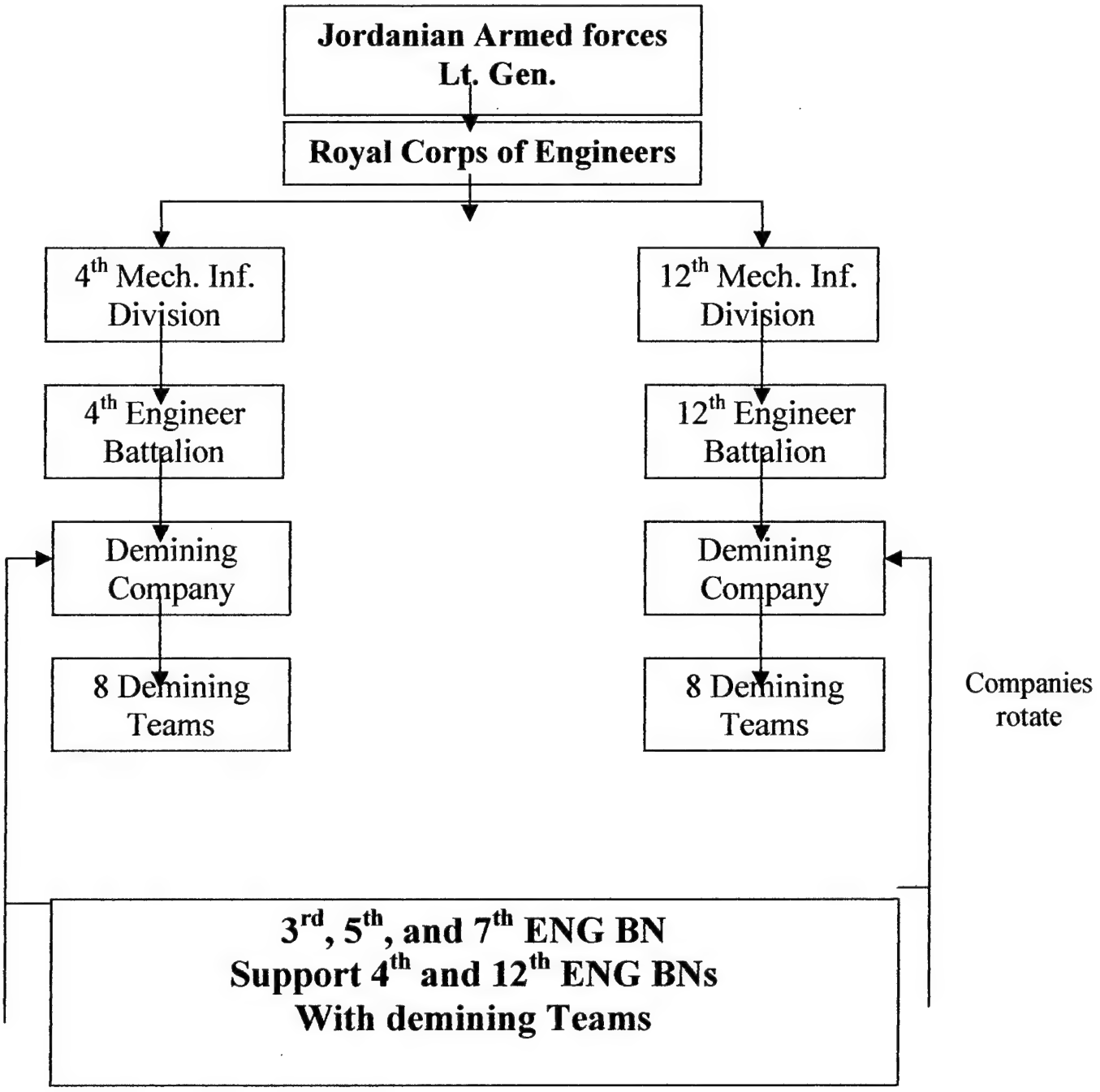

Figure 1 current JAF HQ Organization

Jordanian Requirements for Humanitarian Demining

The director of the Royal Corps of Engineers has established the following requirements for assistance in support of Jordanian demining objectives. They are listed in order of priority:

Enhance individual operational safety. Improving safety is the Jordanian highest priority. Support should focus on the following requirements:

- Upgrade protective clothing, face shields, and blast boots to increase safety of the individual during clearance operation.

-Provide mine detection capabilities that accurately and reliably detect landmines and UXO that are deeply buried in highly mineralized soils.

-Provide reliable and effective vegetation clearance machinery to decrease the risk to deminers and increase efficiency during mine clearance operations.

- Establish internationally recognized standard operating procedures (SOP) for Humanitarian Demining operation.

Provide HD information exchange and new equipment training to enhance current capabilities. Exchanges and training should be tailored to accomplish the following objectives:

- Increase safety during mine clearance. Exchanges will include reliable safe clearance technique to survey, mark, and clear mine areas
- Enhance UXO safety and clearance capabilities.
- Develop a geographic information system to archive minefield data that will assist in mine clearance, mine awareness and victim assistant operations.

- Establish an organic capability to organize, manage, and implement a national mine awareness and victim assistant program.

Upgrade mine sweeping (flail) equipment. The Jordanian Armed Forces currently employs the AARDVARK to proof areas once they are manually cleared. The existing fleet of AARDVARKs was purchased over 15 years ago and its effectiveness is severally degraded due to mechanical and maintenance deficiencies. There is a requirement to:

- Either purchase MARK III or MARK IV versions or refurbish the current AARDVARKs fleet to MARK III (Norwey has pledged to purchase up to two MARK IV system and the United kingdom has pledged to upgrade several of the existing system to MARK III configuration).
- Find new or improved mine sweeping equipment to satisfy the JAF requirement.

Purchase earth-moving equipment. Jordanian Armed Forces demining technique include removed of large amounts of soil to proof areas were mine not located using manual and mechanical clearance method. The following requirement will facilitate the quality assurance process by providing the demining units with organic earth moving and sifting capabilities:

- Purchase Bulldozers, front-end loaders, and dump trucks.
- Provide operator and maintenance training and spare parts to ensure this equipment is well maintained.
- Identify and purchase other technology to assist in sifting and removing mines from excavated earth.

Purchase mechanical detection and clearance equipment.

- Purchase equipment that can effectively process soil to destroy and/or remove deeply mines.
- Purchase proven mechanical detection and clearance devices that increase the accuracy of mine detection and the speed of clearance operations.
- Host field tests of emerging demining technology.

Develop a National Mine Awareness and Victim Assistance Campaign.

- Develop an organic capability to develop strategies and implement national, regional, and local mine awareness and victim assistance campaign.
- Organize and coordinate Non Governmental Organization and Developmental to assist in implementation of these programs.

Incorporate Mine Detecting Dogs (MDD) in HD operations. Requirement include:

- Develop an organic MDD capability.
- Provide a reliable detection capability.

Foreign support.

US Government Support

- **Objectives**
  - Reorganize the current Jordanian Armed Forces demining infrastructure and develop A National Demining organization.
  - Provide equipment information exchanges, and new equipment training to significantly enhance Jordan's demining, mine awareness, and victims assistance capability.

- Provide logistics support to assist Jordan with achieving its program goals and objectives.
- Develop national programs that will help to reduce civilian causalities caused from landmines and UXO contamination.
- Encourage other donors to provide support to assist in sustaining a viable Jordanian HD program.

- **American assistance**. American assistance amounted to $3.1 million in the fiscal years 96, 97, 98 and 99, an additional $1.5 million has been allocated for 2000.

Norwegian support. Assistance for fiscal year 1998 totaled $700,000 out of which an AARDVARK minesweeper has been purchased. The rest was used to by safety equipment. The Norwegian Government has assigned during the Jordanian Delegation visit lately $1.1 million for fiscal year 2000 as assistance for purchasing demining equipments.

Canadian Support. Canadian assistance amounted to $300,000 in fiscal year 1998. $500,000 has been allocated for fiscal year 1999, which were used to purchase safety equipment and C.T loader.

CHAPTER 6

Jordan Transparency

General. Complying with the transparency measure on the prohibition of the use, stockpiling, producing, and transfer of anti-personnel mines, and on their destruction, Jordan has set a strategic plan through which all anti-personnel mines will be completely demolished by open burning and open detonating over a period of 3 years.

National Implementation measures. Jordan took all appropriate legal, administrative and other measures, including the imposition of penal sanction, to prevent and suppress any activity prohibited to a state party under this convention undertaken by persons under its jurisdiction or control.

- No person shall transport, manufacture, purchase or sell any explosive, except where such person is in possession of a license issued in due form by the licensing authority (the Minister of Defense or his duly authorized representation).[26]
- Before issuing a license for the manufacture of explosive, the license authority shall secure the consent of Cabinet. [27]
- Every licensed dealer shall be responsible for keeping records listing full particular of all explosive he has manufactured, import, stored on his premises, purchased or sold. [28]
- Every licensed dealer shall prohibit from selling any explosive to any person who is not in possession of a purchase license. [29]
- Every dealer shall be responsible for as certaining the licensed holder's identity, and shall be restricted to the quantities specified in the license.[30]

- License for the purchase of explosive shall not be transferable. [31]
- Every police officer may require any person with explosives in his possession to produce evidence in six months. [32]
- Every dealer shall produce his records for examination by the licensing authority every six months. [33]
- Every person found with gunpowder in his possession shall be liable to a term of imprisonment not more than one year and a fine of 100 dinars.[34]
- Every person who, not being in possession of a valid license, is found with any explosive in his possession, or transports, purchases or sells any explosive for unlawful purpose, or uses any explosive for purpose of terrorist activities, shall be liable to the death penalty.[35]

Stockpiled Anti-personnel Mines. Jordan reported to the Secretary-General on the total of all stockpiled anti-personnel owned by it.(see Annex A.)[36]

AP Mines Retained or Transferred. Jordan reported to theUN Secretary-General on the types, quantities, manufacture number of all AP mines retained or transferred for the training in mine detection, mine clearance or mine destruction techniques, or transferred for purpose of destruction, as well as the institutions authorized to retain or transfer anti-personnel mines.(SEE Annex B.)[37]

Status of programs for Destruction of AP mines. Jordan program destruction of AP mines including details of methods which will be used in destruction, and the applicable safety and environment standard to be observed.

Measures to provide warning to the population.

-All Jordanian minefields are perimeter-marked, monitored and protected by fencing and other means.

- Engineering battalions maintain these minefields on regular basis.
- Mine awareness lectures are presented in the universities, colleges, and public schools, especially those close to the minefields.
- Mine awareness programs are conducted through mass midia.

CHAPTER 7

Jordanian National Demining Organization

National Demining Committee

The National Demining Committee will consist of representatives from all pertinent Ministries as depicted in figure 2. The function of the committee is to establish all National demining policy and priorities and provide oversight of the Jordanian Armed Forces. Staff and operational personnel will be trained, officers equipped, and coordination lines delineated to facilitate management of national-level program.

National Mine Action Center

The Mine Action Center is primarily staffed by representative and personnel from the Royal Corps of Engineers and is under direct control of the Jordan Armed Forces.

The National Mine Action Center will have liaison representation from appropriate ministries. The National Mine Action Center maintains oversight of all demining operations within Jordan and will be responsible for implementing policy as established by the National demining committee. The NMAC will also be the conduit and coordinating authority for all NGO, PO and donor organization efforts and contribution within Jordan.

Regional Mine Action Center

The function of the Regional Mine Action Center is to execute demining operations as directed by the National Mine Action Center. The staff of the regional Mine Action Center is larger than that of the National Mine Action Center because it is responsible for all field operation. The field operations will be planned, executed, and supported by the regional Mine Action Center. The RMAC is the functional and

operational arm of the NMAC and controls the demining units conducting mine awareness, survey and data, and mine clearance operation.

Demining Company

The demining company will conduct demining operations under the direction and with the support from the Regional Mine Action Center. Since each company consists of only deminers, it must be supported by other elements of the RMAC. The company commander will obtain RMAC support from the following divisions while executing clearance operations.

-Medical	1 Medical Team per platoon.
- Operations	1 Survey and Data/UXO Team per Company.

Jordanian National Demining Organization

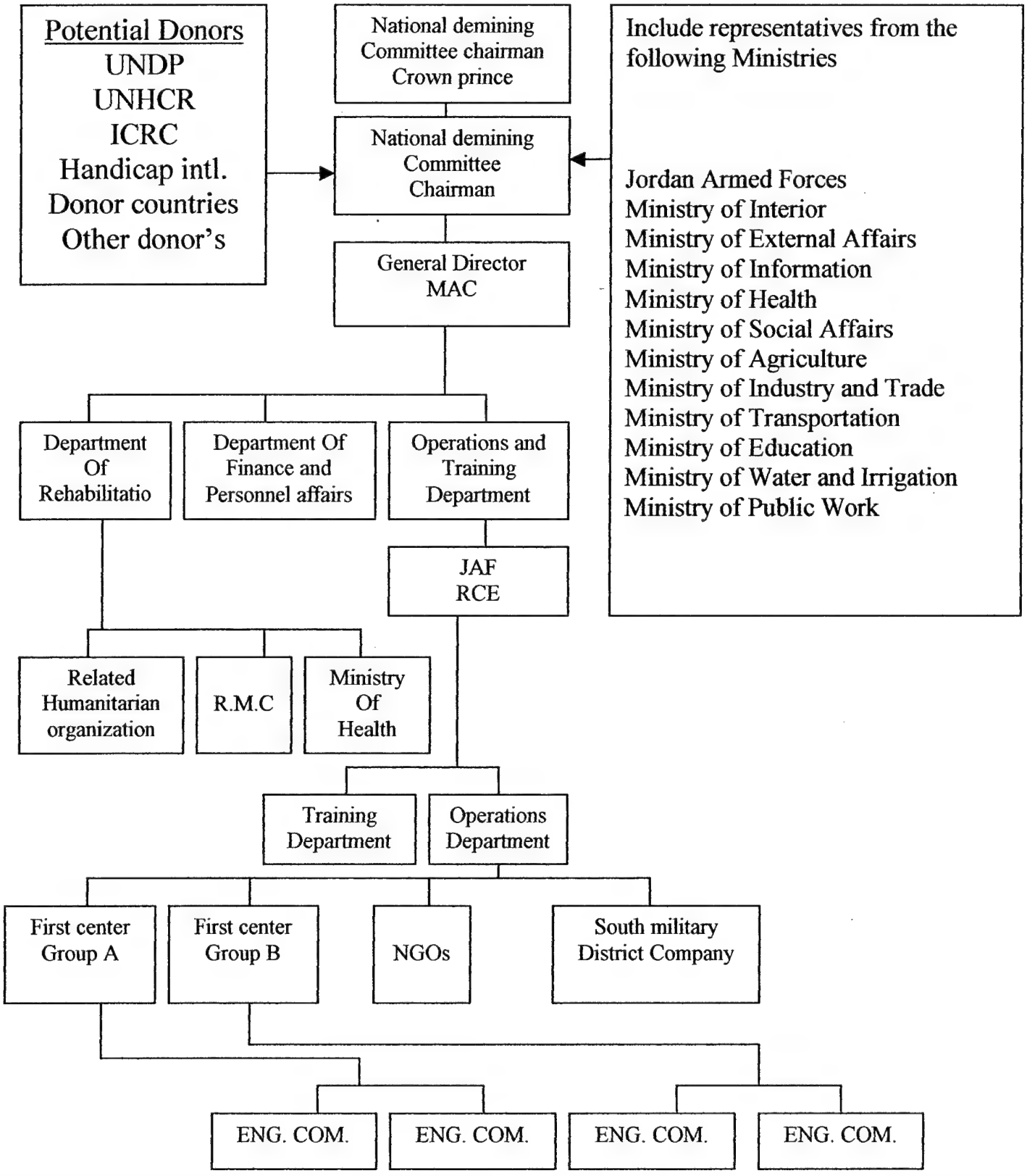

Figure 2

CHAPTER 8

The Contribution of Technology

Despite the best efforts of all who engage humanitarian demining throughout the world, getting landmines out of the ground remains a slow, dangerous, and labor-intensive process. Since the Second World War, technology advances have strongly favored mine laying over mine clearance. Today APL can be made smaller and cheaper and with so little metal in them as to be very often undetectable by standard mine detector.

Technology has the potential to help reduce this imbalance and create new advantages for the deminers. National Governments, NGOs, and private companies are pursuing a number of promising new technologies. While it is unlikely that any silver bullet-demining tool will ever be found to make humanitarian demining quick, safe, and easy, there is promise for vast improvements in detection, clearance, and neutralization tools.

Detection

The major problem in mine clearing is discrimination. Modern APL is inexpensive, small, and made of various substances, thereby making it nearly impossible for the common metal detector to distinguish the form of metallic debris. Landmines can also be made of plastic, which is not detected by the metal detector. The variety of fuses used has progressed from simple pressure sensor to magnetic, electric and heat sensors. Despite the advance in landmines, however, the means for detecting them has not changed appreciably since World War II. The majority of mine detection operations today are accomplished manually, predominately with metal detectors and, ultimately,

with non-metallic detectors to positively identify a buried object. This method is slow, hazardous, and expensive, but it is also reliable and currently the only method capable of meeting the United Nations 99.6 percent clearance goal. Consequently, it is clear that technologies must develope that speed, the detection process and better protect the mine clearers.

Since finding and identifying landmines are the most difficult parts of the humanitarian demining process, most research and development is being directed toward improving detection. The goal is to automate the detection task, increase the detection rate, improve the ability to positively discriminate the landmine from metallic debris, and protect the operator. Some of the innovative technologies are discussed below.

Ground-penetrating Radar (GPR). GPR emits electromagnetic waves into the ground which are reflected, measured, and based on their variations, detect the presence of different types of buried objects. Using GPR is a slow process, since moisture as well as clay materials degrade its performance. Research is underway to overcome these limitations, as well as to develop portable and vehicle-mounted solution.

Infrared Detection. Because of the material from which they are made, landmines retain or release heat at a different rate than their surroundings. Infrared cameras or sensing devices can measure that difference and potentially detect the pressure of mine-like objects. However, infrared systems can be affected by weather conditions and background environment, as well as by the size and composition of the landmine. Infrared sensors also have difficulty detecting deeply buried objects and are currently limited to non-folated terrain.

Advanced Electromagnetic Induction (EMI). The most common EMI device is a metal detector, which measures the disturbance of an emitted electromagnetic field by an object in the ground. However, the detector cannot distinguish between a landmine and other metallic objects, and its effectiveness diminishes rapidly with an increase in distance to the target. Studies have been initiated to determine if it is possible for improved metal detectors to overcome these limitations.

Acoustic Sensors. Ultrasound detection is the emission of a sound wave into a medium to measure the difference in the reflection of materials with varying acoustical properties. This technology works best when used in extremely close to the target, but it would still have difficulty in discriminating between rocks and landmines.

Chemical Detection. Most detection devices currently in use attempt to find landmines by focusing on the difference between the landmines and their surroundings. Chemical detection focuses on the one element unique to all landmines, the explosive material. This is like a dog's keen sense of smell to search for landmines, which is a current technique. However, there are limitations to using dogs for detection; to reduce the limitations, there is ongoing research to develop sensor systems to replicate the dog's capability to detect trace explosive.

Bacteriological. This involves the genetic construction of microorganisms, which recognize compounds such as explosive and generate genes in response to that compound. The microorganisms are applied by spraying the ground to contact trace explosives, causing area with explosive-like compounds to produce light or

a fluorerscent effect. Detection is then accomplished by use of hand-held detectors, or visual inspection. However, weather and environmental conditions pose significant obstacles to employing this method.

Clearance

Clearance is the process of removing, destroying, or neutralizing landmines to make the land suitable for other uses. A mechanical means of mine clearing is required to speed up the process and make it safer for operators. Most of the known mechanical clearance means have been developed for military use and are not designed for area clearance. Mechanical devices are expensive and difficult to maintain.

Ploughs. Ploughs, usually mounted on the front of a dozer or other prime mover, have been used for cutting lanes through minefields for some time; they simply push landmines aside and leave them in the brims created on either side of a rout to be removed later.

Rollers. Rollers are usually pushed or pulled over terrain by another vehicle with the hope that the pressure exerted by their weight will either crush or detonate landmines. Terrain and the environment can limit their effectiveness.

Rotary Drum Rotary Tiller. This device consist of a rotating drum or drums with rotating metal teeth similar to a rock crusher mounted on its circumference. It can be mounted on a prime mover such as a mine-hardened vehicle. Some tillers are able to reach landmines as deep as 50 centimeters. However, these machines are large and some weight as much as 45 tons. This limits their effectiveness in some types of terrain, and maintenance costs are high.

Flails. Flails have been used primarily by the military to clear lanes through minefields, and several versions are deployed in humanitarian demining operations. They consist of large chains connected to a rotating drum that beat the ground either detonating or destroying the landmines. This machine is large, expensive, difficult to maintain, and can damage the terrain by removing the topsoil. Smaller versions of the flail, miniflails, have been developed to be not only less expensive, but also remotely controlled, although they lack the capability to destroy or detonate blast-hardened landmines.

Mine-proof Vehicles. These are vehicles that are hardened to withstand explosions. Developed for military use in force protection and road clearing operations, they are useful in humanitarian demining as protection when transporting mine-clearing team. Other uses are as prime movers for ploughs and sensors or as clearing/proofing method to ensure that all landmines have been removed by criss-crossing a cleared area.

Mechanical mine clearing alone cannot meet the UN's 99.6 percent clearance goal. However, machines can speed the clearance process when used in combination with manual clearance, and they may also be useful in quickly verifying that an area is clear of landmines so that manual cleaning can concentrate on those areas that are most likely to be invested.

Neutralization

Once landmines have been found and identified, they must be destroyed or neutralized. The most common methods in use are to detonate the landmine by means of pressure or explosive, or to remove and destroy it later. Recent developments of

explosive foam, mine marking and neutralization foam, shaped charges, and chemical neutralization are promising methods that bear consideration to on-site destruction of landmines. Both types of foam have been used in the field with some success, while the shaped charge and chemical methods are still in the late development stage.

Technology has become the solution to many long-standing problems, including humanitarian demining efforts. Many developments are on the verge of breaking through to solve the identification problems, and there have been significant efforts made in the areas of clearance and neutralization. Other efforts include developing protective garments for mine clearers, mine awareness programs, and mapping systems.

But technology is not a panacea for all the ills of demining. Any single breakthrough should be viewed as yet another tool available for use in the demining process, and it may not be appropriate under all conditions. Furthermore, careful study of the limitations of any tool with the regard to the location and environment is critical. The knowledge required to operate a machine may not match the skill level of the deminers, many of whom are drawn from the local populace. The cost of maintenance and the availability of logistics supports are important to sustain operations. All of these considerations, and more, must be taken into account before a decision to procure and use and device is made.

While current technology may be effective, it is far too limited to fully address the huge mine problem facing the world. New research and development programs underway in several countries show promise for new methods, which are safer and more effective. The international community must act now to faster and further these research programs in order to provide clearance personnel in the field a better tool than sharpened stick.

CONCLUSION

Calculating the total number of landmines affecting the world today remains a difficult task . while I believe the number is considerably less than the 80- 110 million previously estimated, probably on the order of 60 million, it is still staggering .

A more relevant measure of the problem, however, is not the number of landmines per country, but the number of square kilometers of productive land rendered unusable by the presence or suspected presence of landmines or other unexploded ordnance (UXO). This measures provides the international community a better basis for determining how to direct and prioritize its humanitarian demining efforts to return land to safe and productive use.

The impact of landmines extends far beyond the immediate danger to individual lives and property and affects virtually every aspects of life in heavily mine-infested regions. The total toll that landmines take is far greater than the $300-1,000 required to remove one of them from the ground or the cost ($100 to $3,000) to provide a prosthetic devise for a victim. These costs are especially onerous for agrarian societies which typify the mine-infested areas.

The unseen costs and impact of landmines include:

- **Midical:** Treatment and rehabilitation of victims, when services are available, can take years and deplet scarce medical resources in poor countries.
- **Refugees and repatriation:** The presence of landmines impedes the return of refugees and the rebuilding of war-torn societies, prolonging the consequences of war and arm conflict.

- **Economic:** Landmines prevent the fullest utilization of farmland, destroy livestock, and disrupt markets and production patterns.
- **Environmental:** Damage to the wildlife, forests, and other environmental resources has consequences for both economical and social development. Minefields sometimes become breeding grounds for disease.

On March 15, 93 jordan implemented a national demining program to address its landmine problem. With limited resources, the Jordanian Armed Forces (JAF) Royal Corps of Engineers (REC) was tasked to develop and execute a deminig strategy to eradicate the threat of landmines. Over the years the jordanian have demostrated a strong commitment to their demining efforts. The program reveals clearly stated goals and objectives, and has yielded the return of over 3 million square meters of land for productive use by local inhabitants. The aim of the program is to achieve the following objectives:

- Return denied lands to productive use;
- Allow infrastructure development in mined areas;
- Eliminate the dangeres of landmines to the civilian populace;
- Prevent terrorist from removing and reusing landmines for sabotage purposes;
- Enhance confidence building measures with israel after the peace treaty was signed; and
- Support the accords of the International Landmine Ban Treaty.

Annex A: Jordan stockpiled AP mines

Type	Quantity	Manufacture number
M14	84677	1345-006k121 10p
M18A1	5771	1345-006k14,k145
M35 Belgium	413	PRB
NO. 6	268	TH12-53441
72 Russian	1000	CN1831023
VS-50 Italian	980	N.007/83
An Italian thrown Mine	5	Not Available
Wooden Mine, Syrian	52	10-24-58
Explosive Mine, Italian	4	Not Available
NO. 5	2	Not Available
Egyptian Mine	55	Not Available
Detonator Capsule for the Egyptian wooden Mine	115	Not Available
Total	93342	

Annex B: AP mines retained or transferred

Table B-1. Mine Retained for Training

Institution Authorized	Type	Quantity
Royal Engineering school	M14	800
	M35	100
	M18A1	100
Total		1000